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R645-301-200. SOILS.

210. INTRODUCTION.

The Reclamation Plan (See Reclamation Plan Volume), is divided into four areas: the Valcam Loadout Facility; General Office Area; Belina Haul Road; and the Belina Mine Site.

220. ENVIRONMENTAL DESCRIPTION.

The Valley Camp of Utah, Inc. Mine Permit Area consists of about six and one-half square miles of land situated in the Wasatch Plateau of Utah astride the Carbon-Emery county line. The property straddles the divide between the headwaters of Huntington Creek on the west and Pleasant Valley on the east. Elevations vary from a low of about 8000 feet in the Pleasant Valley drainage to a high of near 9800 feet on the divide crests. Canyon slopes are steep with rounded summits, and are vegetated.

A presubsidence survey within or adjacent to the Valley Camp of Utah, Inc. Mine Permit Area conducted for Valley Camp Utah, Inc. by Endangered Plant Species through Vaughn Hansen Associates, demonstrates that areas for agricultural or silvicultural production of food and fiber and grazing lands are of such low production that they can be classified as non-renewable resource lands. This survey was conducted by subconsultants under the direction of Vaughn Hansen Associates. This information was reorganized for insertion into the permit by both Valley Camp personnel and Mr. Lynn Kunzler (an employee of the Division) to meet the requirements for the "Renewable Resource Survey". This Section 200 contains the reorganized survey data.

221. PRIME FARMLAND INVESTIGATION.

The Mine Permit Area soils do not meet the requirements as: "The growing season is too short and without irrigation water the moisture requirement for prime farmland cannot be met." As per May 28,1982 letter by Mr. George D. Macmillan, State Conservationist, USDA Soil Conservation Service, P.O. Box 11350, Salt Lake City, Ut. 84147. See Appendix 2-2.

222. THROUGH 223. SOIL SURVEY. (Resource Information)

NOTE: The terminology "Proposed Conveyor Corridor" was previously withdrawn from the MRP text along with the nomenclature and proposed conveyor route from the Soils and Vegetation maps. The site locations of the Vegetation and Soil Study in Eccles & Whisky Canyons were however, retained on the said maps, and results of that study are found in this section and the Biology section of the MRP.

Vegetation and Soils Study

This study was and is considered an adequate soil survey and meets the standards of the National Cooperative Soil Survey as of 1980.. Mr. Stanley Welsh, Leah Juarros, Joseph R. Murdock, and Elizabeth Neese of Endangered Plant Studies, Inc., in 1980 did the Vegetation and Soils Study for Vaughn Hansen Associates, Inc., Waterbury Plaza-Suite A, 5620 South 1475 East, SLC, Utah d.b.a. Hansen Allen & Luce, Inc., SLC, Utah, for Valley Camp of Utah, Inc. The purpose of the studies were to gather data for the "Report of Vegetation, Threatened and Endangered Plant Species, Soils, and Reclamation Plans for Valley Camp of Utah, Inc., and Lease Area, Carbon--Emery counties, Utah."

These investigations were designed to provide Surface Mining regulations (783.19, 783.21, 783.13, 784.21), U.S. Forest Service requirements, and requirements of the Utah Division of Oil, Gas & Mining. Included in 300 Biology section is a description of the plant communities, a list of plant species by vegetative type, estimates based on random sampling of cover and productivity for areas that could be disturbed and for comparable areas which will not be disturbed, and maps showing vegetative and soil types and sample locations. Soils are described and reclamation potential is also discussed.

Valley Camp of Utah, Inc. lease area soils are developed in vegetation types and topographic features similar in all major respects to the adjacent Skyline lease area soils. Corresponding soils data presented within the text are for the Valley Camp lease area and are based in part on previous extensive studies of the adjacent Skyline lease area. Data for those studies were collected as follows:

Soils Analysis (methods)--At each vegetation site a soil pit was excavated to the parent material, or to a depth of 60 inches, whichever occurred first. The exposed soil profile provided information for classification of the soils into taxonomic units. Samples were taken from each of the horizons exposed in each pit and were analyzed for major chemical properties.

Soils were classified to family unit according to the system utilized for classification of soils by the Soil Conservation Service (Johnson, 1975). Use of this method has allowed for correlation of these soils to series level with the new Carbon/Emery County soils mapping effort recently completed by the Soil Conservation Service and Forest Service.

Chemical analyses for micro-nutrients were made by testing a soil extract with VXK solution and were measured by use of an atomic absorption analyzer. Ammonium acetate was used to extract sodium, magnesium, and calcium for atomic absorption analysis. The Kjeldahl method was used for determination of percent organic matter. All analyses were conducted in the Agronomy Laboratory at Brigham Young University.

Soil texture was determined by using a Bouyoucus hydrometer method, with sodium hexametaphosphate dispersing agent. Soil reaction was determined on a 1:1 soil/water mixture which was tested in a Corning Ph meter Model 10. Salinity was analyzed by use of a Wheatstone conductivity cell on an extract of each soil sample. Carbonate content was estimated from observations of effervescence following application of a 10 percent solution of hydrochloric acid. The scale of effervescence follows the rating system suggested by the Soil Conservation Service (USDA Soil Survey Manual, 1937). Soil color was obtained by comparing a moist and a dry sample with the standard Munsel soil color charts. Observations of soil structural units also follow the Soil Conservation Service suggested designation as outlined in the Soil Survey Manual.

Local climatic data suggest cryic and frigid temperature regimes. The cryic regime is typically conifer-aspen related, and includes some high meadows. These areas are too cold for cultivation of crop plants by ordinary means. Frigid designation is given to soils typical of sagebrush types;

some crops can be grown on these soils. Most of the soils are in the ustic (moisture arriving in summer) regimes.

All soils have textures ranging from sandy loams to clay loams, and are considered neither unusual for the area in general or for the vegetation types these soils support. A comparison of spruce-fir and aspen soils, which as broad categories make up more than 80 percent of the lease area soils, shows that the Ph and salinity measurements are probably normal for this climatic regime with the Ph range from mildly acidic to neutral. There is a slight difference in soil reaction between spruce-fir (pH 5.0) and aspen (pH 6.0) soils. It is characteristic that the evergreen conifer types are more acidic than the deciduous forest of aspen.

Even the most saline soil measured in the lease area, with an EC x 10 measurement of 1.88, is considered extremely low when compared to agricultural soils. A slight difference between soils is noted when depths are compared. The solum of aspen extends to an average depth of 20 inches at nine locations and to 18 inches at seven locations of the spruce-fir type. This corresponds to the average depths of measurements in aspen of 19.9 inches and of 18.1 inches in spruce-fir soils. It is also apparent that soils in aspen communities are more fertile in the commonly applied fertilizer elements nitrogen, phosphorus, and potassium, and also in most micro-nutrients. The levels of iron, magnesium, and manganese are considered to be adequate for growth of native vegetation, even though somewhat below amounts reported for average soils in the Western United States (Shacklette, et al. 1971). Moderate amounts of zinc, calcium, and potassium indicate that adequate quantities of these minerals are present, except in sagebrush soils.

High amounts of calcium, especially in the B-horizon of spruce-fir soils are not considered a problem in immobilization of phosphorus due to the acid pH of these soils. Concentrations of calcium in sagebrush and aspen soils could become a problem in phosphorus relations if soils are altered to become more basic. Nitrate nitrogen is low in quantity, as was expected for these soil types. Average amounts of nitrate nitrogen are inadequate in all soils of the region, and in all horizons. All areas would respond to addition of nitrogen.

In summary, the most important fertilizer to be applied in reclamation is nitrogen. The addition of nitrogen should be timed with suitable moisture content in the soils, which usually occurs in the fall and spring.

The Soils Map 223.100 and Plate 2-1 of the area indicates soils mapping units of the lease area. These units are designated by upper case letter A through E and are mapped at an Order Three intensity. Adjacent soils are designated by lower case letters a through v and are mapped at an Order Two intensity. A dashed line is used to enclose these mapping units. Taxonomic classification of the soil sample is summarized as follows:

MAP 223.100. Soils

TAXONOMIC CLASSIFICATION

MAP UNIT	TAXONOMIC CLASSIFICATION	SAMPLE SITE
A	Loamy-skeletal, mixed Mollic Cryoboralfs (Apr 1990) Fine-loamy, mixed Typic Cryoboralfs.	3
B	Fine loamy, mixed Argic Pachic Cryoborolls (Apr 1990) Loamy-sketetal, mixed Typic Argiborolls.	11
C	Loamy-skeletal, mixed Argic Cryoborolls (Apr 1990) Fine-loamy, mixed Argic Cryoborolls.	12
D	A complex of units B and C (Apr 1990) B&C	
E	A complex of units A, B, and C (Apr 1990) A,B,C	
a	Loamy-skeletal, mixed Mollic Cryoboralfs (Apr 1990) Same as A	
b	Fine loamy, mixed Argic Pachic Cryoborolls (Apr 1990) Same as B	11
f	Similar to B with 30% of the soils having a slope greater than 60% and as much as 50% rock fragments less than 12 inches. (Apr 1990) Similar to B with 50% rock Fragments.	11
g	Coarse loamy, mixed Pachic Cryoborolls (Apr 1990) Same as B.	10
h	Rock outcrops	
i	Loamy-skeletal, mixed Typic Cryoborolls (Apr 1990) Same.	8
k	Course-loamy, mixed Cumulic Cryoborolls (Apr 1990) Fine-loamy, mixed Calcic Pachic Cryoborolls.	6
l	Loamy-skeletal, mixed Typic Cryoborolls (Apr 1990) Same as i.	5
m	Loamy-skeletal, mixed Typic Cryoboralfs (Apr 1990) Same as A.	4
p	Coarse-loamy, mixed Mollic Cryofluvent (Apr 1990) Fine-loamy, mixed Cumulic Cryoborolls.	2

MAP UNIT	TAXONOMIC CLASSIFICATION	SAMPLE SITE
q	Coarse-loamy, mixed Cumulic Cryoborolls (Apr 1990) Fine-loamy, mixed Cumulic Cryoborolls.	1
r	Coarse-loamy, mixed frigid Typic Argiborolls (Apr 1990) Same as B.	15
s	Complex of 10% r, 45% t, and 35% u (Apr 1990) r, t, u.	-
t	Coarse-loamy, mixed frigid Mollic with 15% u and 5% q (Apr 1990) Same as A.	17
u	Coarse-loamy, mixed frigid Typic Haploborolls with 5% r (Apr 1990) Fine- loamy, mixed Cumulic Haploborolls.	18
v	Loamy-Skeletal, mixed Lithic Cryocrepts (Apr 1990) Same as A.	7

MAP UNITS A AND a

These units consist of deep well drained soils that have formed in colluvium and residuum. They are on steep north-facing slopes ranging from 35 to 60 percent. Included is 5 percent rock outcrop and 5 percent similar soils.

The surface texture is loam or very fine sandy loam. Thickness of the mollic epipedon ranges from 2 to 4 inches. The A2 horizon ranges from striping of ped faces to a leached horizon 4 inches thick. Depth of the argillic horizon is 12 to 15 inches. Depth of the C horizon is 18 to 22 inches. Percent of rock fragment by volume in the upper 20 inches ranges from 5 to 15 percent. The lower portion ranges from 35 to 55 percent. Erosion hazard is slight, but severe if disturbed due to surface textures and steep slopes. The potential rating for borrow soil is poor due to thin surface layers, rock fragments content, and steep slopes.

TABLE 222a.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 3
MAPPING UNIT: A,a

VEGETATIVE TYPE: SPRUCE/FIR
LOCATION: PERMIT AREA

HORIZ	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG MAT.
0*	2-0	-	-	-	-	-	-	-	-	-
A1	0-3	10YR 5/2	10YR 3/2	33	55	12	sl	lmkpl / 2mgr	5gr	6.99
A2	3-7	10YR 7/2	7.5YR 5/4	48	37	15	l	2m sbk	5gr	0.44
B21	7-14	10YR 7/2	10YR 5/4	48	39	13	l	2m&f sbk	5gr	t
B22**	14-20	10YR 7/3	10YR 6/4	49	39	12	l	2m sbk	10gr,5k	t
C	20-52+	10YR 8/4	10YR 6/6	43	39	16	l	m	5s	t

HORIZ	Ph	EFFERVESCENCE	ECX1000	SOLUBILITY ppm			SAR	PERCENT
				Ca	Mg	Na		MOIST.SATUR.
0*	-	-	-	-	-	-	-	-
A1	6.3	eo	0.67	86.9	10.4	10.7	0.14	61
A2	5.6	eo	0.31	44.8	4.8	9.9	0.19	26
B21	5.6	eo	0.29	41.8	4.6	11.8	0.23	24
B22**	5.4	eo	0.26	35.0	5.8	15.0	0.31	21
C	5.6	eo	0.31	27.8	4.2	20.8	0.48	21

Taxonomic Classification: Loamy-skeletal, mixed, mollic cryoboralfs.
* Decomposing spruce/fir needles and twigs
** 20% 10YR 7/2 and 15% 10YR 6/8 weathering stains

October 2001

MAP UNITS B, b, AND f

These units consist of deep well drained soils that have formed in residuum and colluvium. They are on steep mountain slopes and benches with slopes of 35 to 50 percent. Included is 4 percent moderately deep similar soils.

Surface texture ranges from loam to a fine sandy loam. The argillic horizon texture ranges from a loam to a clay loam. The texture of the C horizon is variable due to location of weathered sandstone fragments ranging from clay to loam to a sandy clay. There is 5 to 10 percent by volume of rock fragments throughout the profiles. Thickness of surface horizons ranges from 8 to 14 inches. Depth of the argillic horizon ranges from 12 to 18 inches. Depth of the C horizon ranges from 26 to 30 inches, and depth to bedrock ranges from 48 to over 60 inches. Erosion hazard is moderate. Soil creep is evident. If disturbed, erosion hazard is severe due to steep slopes and a past history of down-slope movement. Potential rating for borrow topsoil is poor due to steep slopes. Otherwise, this is a good source. Predominant vegetation is aspen.

TABLE 222b.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 11
MAPPING UNIT: B,b,& f

VEGETATIVE TYPE: ASPEN
LOCATION: PERMIT AREA

HORIZ	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A11	0-3	-	7.5YR 3/2	50	28	22	scl	2mgr	-	6.98
A12	3-9	-	7.5YR 3/2	53	27	20	scl	1f sbk	-	4.78
B1	9-14	-	7.5YR 3/2	53	25	22	scl	2c sbk	-	1.81
B2+	14-24	-	10YR 3/3	51	28	21	scl	3mpr	2gr	1.44
B3	24-48	-	10YR 4/3	50	28	22	scl	2c sbk	7gr	0.77
C	28-50	-	10YR 5/4	41	24	25	l	m	5gr 10k	0.41

HORIZ	pH	EFFERVESCENCE	EC X 1000	SOLUBILITY PPM			SAR	PERCENT MOIST. SATUR.
				Ca	Mg	Na		
A11	6.9	eo	0.20	63.5	10.9	9.6	0.15	49
A12	7.0	eo	0.43	42.6	5.6	11.8	0.23	36
B1	7.1	eo	0.38	34.6	4.0	22.1	0.47	28
B2+	7.0	eo	0.33	27.8	3.0	17.8	0.43	25
B3	6.9	eo	0.32	27.5	2.7	19.8	0.48	25
C	6.7	eo	0.37	35.5	4.0	23.7	0.50	27
R*	-	-	-	-	-	-	-	-

Taxonomic Classification: Fine loamy, mixed Argic Pachic Cryoborolls
* Sandstone

October 2001

MAP UNIT C

This unit consists of moderately deep, well drained soils that have formed in residuum and colluvium. They are on steep mountain slopes of 35 to 50 percent. Included in this unit are 5 percent similar shallow soils, 5 percent rock outcrop, and 3 percent similar deep soils.

Surface texture is silt loam to clay loam. Thickness of the surface ranges from 7 to 11 inches. Depth to the argillic ranges from 15 to 20 inches. Depth to sandstone bedrock ranges from 30 to 40 inches. There is 0 to 5 percent rock fragment by volume in the upper 30 inches. The C horizon ranges from 35 to 55 percent rock fragment by volume. Erosion hazard is moderate at present and severe if disturbed due to steep slopes. Potential rating for borrow topsoil is poor due to steep slopes. The dark surface soil averages 20 inches in depth. Present vegetation is predominantly a grass and forb mixture with a few snowberry and elderberry bushes.

TABLE 222c.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 12
MAPPING UNIT: C

VEGETATIVE TYPE:GRASS/FORB/ELDERBERRY
LOCATION: PERMIT AREA

HORIZ	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A11	0-4	10YR 3/2	10YR 3/2	22	45	33	cl	2m gr	2gr	5.31
A12	4-8	-	7.5YR 3/2	32	38	30	cl	lm sbk 2fgr	2gr	4.19
B21	8-19	-	10YR 4/2	34	35	31	cl	2c sbk	4gr	2.52
B22+	19-29	-	10YR 4/2	34	36	30	cl	2m pr	5gr	2.23
C	29-33	-	10YR 5/5	39	34	27	l	m	10gr 15k 20s	0.83
R*	33+	-	-	-	-	-	-	-	-	-

HORIZ	pH	EFFERVESCENCE	EC X 1000	SOLUBILITY PPM			SAR	PERCENT
				Ca	Mg	Na		MOIST. SATUR.
A11	6.7	eo	1.28	26.1	24.8	15.7	0.26	44
A12	6.5	eo	0.44	47.7	5.4	14.7	0.27	39
B21	6.8	eo	0.33	34.1	2.9	16.8	0.37	35
B22+	6.8	eo	0.32	31.5	3.2	18.4	0.42	34
C	6.7	eo	0.35	36.8	4.0	17.6	0.37	29
R*	-	-	-	-	-	-	-	-

Taxonomic Classification: Loamy-skeletal, mixed Argic Cryoborolls
* Sandstone

MAP UNIT g

This unit consists of moderately deep, well drained soils that have formed in colluvium. They are on steep mountain sides with slopes of 35 to 50 percent. Included in this unit is 6 percent of Map Unit k, Cumulic Cryoborolls, and 2 percent rock outcrop.

Surface texture ranges from a loam to a fine sandy loam. C horizon texture ranges from a loamy very fine sand to a fine sand. Percent rock fragment by volume ranges from 10 to 15 at the surface and 35 to 70 in the C horizon. Depth to sandstone bedrock ranges from 25 to 38 inches. Erosion hazard is moderate at present and severe if disturbed due to surface texture and steepness of slopes. The potential rating for borrow topsoil is poor due to slope steepness. Present predominant vegetation is aspen.

TABLE 222d.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 10
MAPPING UNIT: g

VEGETATIVE TYPE: ASPEN
LOCATION: PERMIT AREA

HORIZ	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-6	10YR 4/2	10YR 3/2	63	21	16	sl	3f gr	10gr	7.83
AC	6-20	10YR 5/2	10YR 3/2	64	22	14	sl	2f sbk 2mgr	10gr 5K	2.81
C	20-31	10YR 6/3	10YR 5/4	64	22	14	sl	lm sbk	20gr 30K 20s	0.58
R*	31+	-	-	-	-	-	-	-	-	-

HORIZ	pH	EFFERVESCENCE	EC X 1000	SOLUBILITY ppm			SAR	PERCENT MOIST. SATUR.
				Ca	Mg	Na		
A1	6.6	eo	0.67	97.1	13.8	6.9	0.09	41
AC	6.7	eo	0.47	65.6	6.6	9.4	0.15	30
C	6.4	eo	0.35	49.1	4.5	10.7	0.20	23
R*	-	-	-	-	-	-	-	-

Taxonomic Classification: Coarse loamy, mixed Pachic Cryborolls
* Sandstone

MAP UNIT h

This unit consists of rock outcrops with less than 5 percent soil associated within the area. The soils dispersed among the rocky areas are similar to those described in Table 222e. Because of the similarities no chart of soils features has been prepared for this mapping unit.

TABLE 222e.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 7
MAPPING UNIT: h

VEGETATIVE TYPE: SAGEBRUSH
LOCATION: PERMIT AREA

HORIZ	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-5	10YR 4/2	7.5YR 3/2	51	31	18	l	2f gr	15gr 15k 10s	5.25
B2	5-16	10YR 5/3	10YR 4/3	50	33	17	vfsl	2f sbk	5gr 30k 15s	1.32
R*	-	-	-	-	-	-	-	-	-	-

Horiz	Ph	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A1	7.1	eo	0.83	133.4	16.8	12.5	0.14	41
B2	7.1	eo	0.54	84.5	11.7	12.0	0.16	31

Taxonomic Classification: Loamy-skeletal, mixed lithic Cryocrepts
* Sandstone

MAP UNIT i

This unit consists of deep, well drained soils that have formed in residuum. They are on moderately steep mountain slopes of 15 to 35 percent. Included in this unit is 8 percent of similar soil with 4 to 8 inches of mollic epipedon and 3 percent of a similar soil with 16 to 26 inches of mollic epipedon.

Textures in the surface are loam to very fine sandy loam.

Textures in the C horizon are very fine sandy loam to loamy fine sand. Thickness of the surface horizon ranges from 8 to 14 inches. Depth to the C horizon ranges from 20 to 40 inches. Rock fragment content by volume is 5 to 15 percent in the surface horizon, 15 to 30 percent in the B horizon and 35 to 50 percent in the C horizon. Erosion hazard rating for the topsoil is fair due to the percent rock fragment and slope steepness. In some places where the surface layer is less than 20 inches the rating is poor. At present the dominant vegetation is aspen and grass.

TABLE 222f.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 8
MAPPING UNIT: i

VEGETATIVE TYPE: ASPEN
LOCATION: PERMIT AREA

HORIZ	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
0*	1-2									
A11	0-2	10YR 4/2	7.5YR 3/2	59	26	14	sl	1mkp1 2fgr	5gr	6.53
A12	2-10	10YR 5/3	7.5YR 3/2	58	25	17	sl	2fobk 2mgr	10gr 5k	3.51
B2	10-23	10YR 6/3	7.5YR 4/4	59	26	15	sl	2m sbk	20gr 10k	1.58
C	23-48	2.5YR 7/4	10YR 5/4	47	29	24	ll	m	15gr 20k k100	t
CR**	48-60+	-	-	-	-	-	-	-	-	-

Horiz	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent
				Ca	Mg	Na		Moist. Satur.
0*								
A11	6.9	eo	0.96	121.4	17.4	9.47	0.11	67
A12	6.8	eo	0.49	55.4	6.1	10.2	0.17	29
B2	6.7	eo	0.33	40.3	2.9	15.2	0.31	22
C	6.3	eo	0.31	35.0	3.4	18.6	0.40	30
C	5.6	eo	0.31	27.8	4.2	20.8	0.48	21

Taxonomic Classification: Loamy-skeletal, mixed typic Cryoborolla.
* Decomposing leaves and twigs **Weathering conglomerate

MAP UNIT k

This unit consists of very deep, well drained soils that have formed in alluvium and colluvium. They are on toe slopes of steep and very steep mountain sides. Slopes range from 15 to 35 percent. Included is 3 percent of a similar soil with 15 to 25 percent cobbles throughout the profile.

Surface horizon textures are silt loam, loam, or very fine sandy loam. The C horizon textures are very fine sandy loam to loamy fine sand and begin at 30 to 36 inches depth. Rock fragment by volume ranges from 0 to 15 percent at the surface and 15 to 35 percent in the lower horizons. Erosion hazard is moderate at present and will be moderate if disturbed due to the location of the fans. The potential rating for topsoil is good. There is a thick surface and there are few rock fragments in the top 40 inches. Predominant vegetation at present is aspen, snowberry, and elderberry.

TABLE 222g.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 6
MAPPING UNIT: k

VEGETATIVE TYPE: ASPEN
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A11	0-4	10YR 4/2	7.5YR 3/2	59	25	16	sl	3f gr	10gr	6.16
A12	4-14	10YR 5/3	5.5YR 3/2	48	34	18	l	2 f&m sbk	10gr 5k	1.07
AC	14-32	10YR 6/3	10YR 3/3	49	33	18	l	2m sbk	10gr 10k	2.72
C	32-48+	10YR 6/3	7.5YR 4/4	52	31	17	l	1 m&c sbk	10gr 15k 5s	t

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent
				Ca	Mg	Na		Moist. Satur.
A11	7.3	eo	.84	111.8	18.6	14.1	0.16	45
A12	7.2	eo	.33	40.0	4.6	14.1	0.28	29
AC	7.2	eo	.32	41.0	4.8	14.6	0.29	27
C	7.4	eo	.31	38.7	4.5	14.2	0.29	26

Taxonomic Classification: Coarse-loamy, mixed cumulic Cryoborolls.

MAP UNIT 1

This unit consists of moderately deep, excessively drained soils that have formed in residuum and colluvium. They are on very steep south facing mountain slopes of 60 percent and more. There is 30 percent rock outcrop and 10 percent shallow soils.

Surface texture is loam to very fine sandy loam. The mollic epipedon ranges from 7 to 11 inches in thickness. Depth to sandstone bedrock ranges from 24 to 40 inches. Percent rock fragment by volume ranges from 15 to 30 percent in the surface horizons and 35 to 65 percent in the lower horizons. Erosion hazard is moderate at present and severe if disturbed due to the steep slopes and sparse ground cover. The potential rating for topsoil is poor due to the thin surface layers, large percentage of rock fragments, and very steep slopes. Predominant vegetation is sagebrush and grass.

TABLE 222h.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 5
MAPPING UNIT: 1

VEGETATIVE TYPE: SAGEBRUSH
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A11	0-3	10YR 4/2	10YR 3/2	30	54	16	sl	2f gr	10gr 5k	2.66
A12	3-8	10YR 5/2	10YR 3/2	54	27	19	sl	1f sbk	10gr 10k	1.86
B	8-24	10YR 7/3	10YR 5/4	56	30	14	sl	2f sbk	10gr 30k 10s	t
C	24-31	2.5YR 7/4	10YR 5/5	52	25	28	scl	1m sbk	5gr 25k 15s	t
R	31+*	-	-	-	-	-	-	-	-	-

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A11	7.3	eo	0.72	112.5	17.6	12.0	0.14	34
A12	7.3	eo	0.54	72.4	11.2	12.5	0.18	30
B	7.4	eo	0.37	52.3	8.3	11.2	0.19	25
C	7.4	eo	0.44	9.0	8.5	17.6	0.30	34
R	-	-	-	-	-	-	-	-

Taxonomic Classification: Loamy-skeletal, mixed typic cryoboralfs.
* Sandstone

MAP UNIT m

This unit consists of deep, well drained soils that have formed in colluvium and residuum. They are on steep slopes that range from 35 to 60 percent. There is 8 percent similar soils included in this unit and 3 percent rock outcrop.

The surface texture is loam or clay loam. The surface is 6 to 10 inches thick. The C horizon begins at 18 to 20 inches. The percent of rock fragment by volume ranges from 5 to 10 in the upper 20 inches and 35 to 75 below 20 inches. Erosion hazard is moderate at present and severe if disturbed due to steepness of slopes. The potential rating for borrow topsoil is poor. There is a large rock fragment content, the surface layer is stony and the slopes are steep. Present vegetation is mostly big sagebrush, snowberry, and an understory of grass.

TABLE 222i.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 4
MAPPING UNIT: m

VEGETATIVE TYPE: SAGEBRUSH
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-8	10YR 5/2	10YR 4/2	32	14	54	cl	3f gr	5gr	4.21
B2	8-19	2.5YR 7/2	2.5YR 6/4	22	37	14	cl	3f abk	5gr	t
C1	19-28	2.5YR 7/5	10YR 5/8	38	28	34	cl	2m sbk	15gr 25k	t
C2	28-36	2.5YR 7/2	10YR 6/3**	71	11	18	sl	m	5gr 20k 50s	t

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A1	7.3	eo	0.88	156.5	8.6	14.4	0.15	56
B2	7.6	eo	0.38	62.2	2.7	11.8	0.20	41
C1	7.7	eo	0.47	81.4	4.3	12.5	1.18	35
C2	7.8	eo	0.44	74.2	2.9	8.8	0.14	28

Taxonomic Classification: Loamy-skeletal,mixed typic cryoboralf.
* 20% 10YR 6/8 weathering stains **10% 10YR 6/8 weathering stains

MAP UNIT p

This unit consists of deep, somewhat poorly drained soils that have formed in recent stream alluvium. These soils are on stream flood plains. Slopes range from 0 to 3 percent. There is 8 percent inclusion of soil with gravel layers at a depth of 40 inches and 2 percent inclusion of soils that are better drained.

The ground water table is high during spring runoff at 8 to 10 inches. Texture throughout the profile ranges from silt loam to loamy fine sand. Thickness of lenses ranges between 2 and 8 inches. There is an area of .5 acres where there is a gravel layer at 2 to 4 inches depth. This is believed to have been hauled into a corral area. There is a rating of good potential for borrow topsoil where the water table is below 12 inches. Otherwise, wetness is restrictive. At present, the predominant vegetation is a grass and forb mixture.

TABLE 222j.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 2
MAPPING UNIT: p

VEGETATIVE TYPE: DISTURBED
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-5	10YR 4/2	10YR 2/2	46	34	20	l	3f gr	-	6.67
AC	1-12	10YR 5/2	10YR 5/2*	32	41	27	l	2m sbk	-	5.77
C1**	12-25	10YR 5/2	10YR 4/3	47	33	20	sl	2c sbk	-	4.31
C2	25-57	10YR 6/2	10YR 4/1	59	26	15	sl	m	-	1.96
C3	57-67	10YR 6/2	10YR 5/2	72	15	13	sl	m	65 gr	2.25

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A1	6.2	eo	3.22	745.0	71.7	15.0	0.07	47
AC	7.2	eo	2.20	455.7	46.1	14.2	0.08	44
C1	7.0	eo	2.34	499.2	66.6	16.0	0.09	42
C2	7.2	eo	1.66	348.2	45.1	20.6	0.14	35
C3	6.8	eo	2.26	499.2	61.4	24.2	0.14	33

Taxonomic Classification: Coarse-loamy, mixed, mollic Cryofluvent
* Mottles begin at 8 inches
** C horizons are stratified layers of sands and silts that vary in thickness and in texture.

MAP UNIT q

This unit is moderately deep to gravel, and moderately well drained. These soils have formed in recent alluvium, and areas on stream terraces. Slopes range from 0 to 3 percent. There is 10 percent inclusion of similar soils in this unit.

The ground water is high during spring runoff at 18 to 24 inches. The surface texture is silt loam to loam. The C horizon texture is loam to loamy very fine sand. Depth to the gravel ranges from 28 to 36 inches. Erosion hazard is slight at present and will remain slight if disturbed. There is a rating of fair potential for borrow topsoil. The course texture in some lenses may be too sandy and the increase of coarse fragments below 40 inches depth makes reclamation potential of the borrow area fair. The present predominant vegetation is a mixture of sagebrush, grasses, and forbs.

TABLE 222k.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 1
MAPPING UNIT: q

VEGETATIVE TYPE: SAGEBRUSH
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A11	0-5	10YR 4/2	10YR 2/2	45	31	24	l	3f gr	-	6.02
A12	5-14	10YR 4/2	10YR 2/2	73	4	23	scl	3f gr	-	3.06
AC	14-24	10YR 5/2	7.5YR 3/2	45	36	19	l	1m sbk/2f sbk	-	1.27
C1	24-31	10YR 5/2	10YR 3/2	48	31	21	l	2c gr	-	1.36
C2	31-42+	10YR 5/3	10YR 3/3	59	21	20	sl	1fsbk	60 gr 4k	1.01

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A11	6.9	eo	2.92	422.4	47.4	13.8	0.08	44
A12	7.3	eo	1.20	235.5	30.4	14.2	0.14	35
AC	7.1	eo	0.97	151.7	32.5	19.4	0.19	30
C1	7.2	eo	0.89	151.8	32.8	26.6	0.25	32
C2	7.3	eo	1.10	204.8	37.3	16.6	0.14	28

Taxonomic Classification: Coarse-loamy, mixed, cumulic cryoborolls.

October 2001

MAP UNIT r

This type consists of well drained soils that have formed in colluvium and residuum. Slope ranges from 8 to 15 percent.

Elevations range from 8000 to 8100 feet. Present vegetation is predominately stinging nettle. Erosion is slight at present and erosion will be slight if disturbed. Suitability rating for topsoil is fair due to depth to bedrock. Range of characteristics include a surface layer 3 to 5 inches thick with 5 to 15 percent rock fragments by volume. The topsoil is 6 to 10 inches thick with 10 to 20 percent rock fragments by volume. Texture of the subsoil is loam or sandy clay loam. The substratum is moderately deep to bedrock at a depth of 30 to 36 inches. There is 35 to 55 percent rock fragment by volume and a texture of loam or sandy loam in the substratum. Included in this unit are 10 percent of the soils described in Unit p and 5 percent of a deep similar soil.

TABLE 2221.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 15
MAPPING UNIT: r

VEGETATIVE TYPE: STINGING NETTLE
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-4	10YR 3/2	10YR2.5/1	33	47	20	Loam	2f gr	10 gr	7.04
B2+	4-12	10YR 5/3	7.5YR 3/2	31	44	25	Loam	2m pr	15 gr	1.40
C1	12-23	10YR 7/3	10YR 4/4	36	44	20	Loam	massive	30 gr 15 cob	t
C2	23-34	10YR 6/4	10YR 4/4	37	41	41	Loam	massive	25 gr 15 cob 5 stone	t
R	33	-	-	-	-	-	-	-	-	-

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A1	7.28	eo	.43	146.0	28.5	17.9	0.18	66
B2+	7.46	eo	.27	36.2	5.9	6.9	0.14	34
C1	7.61	eo	.20	20.2	4.4	9.4	0.25	28
C2	7.48	eo	.26	22.9	4.5	13.9	0.35	26

Taxonomic Classification: Typic argiborolls, coarse-loamy, mixed, frigid

MAP Unit s

This is a complex consisting of 45 percent of the soil described in Unit t, 35 percent of the soil described in Unit u, and 10 percent of the soil described in Unit r.

MAP UNIT t

This unit consists of well drained soils that have formed in residuum. Slopes range from 8 to 15 percent. Elevation ranges from 8000 to 9100 feet. Present vegetation is predominately Douglas Fir and Engelmann Spruce.

Erosion is slight to moderate at present and the erosion hazard will be moderate if disturbed. Suitability rating for topsoil is fair due to depth to bedrock. Range of characteristics include a surface layer 1 to 4 inches thick with 0 to 5 percent rock fragments by volume. The subsoil is 15 to 20 inches thick with 0 to 5 percent rock fragments by volume. The texture of the subsoil is sandy loam or loam. The substratum is moderately deep to bedrock at a depth of 30 to 36 inches. There are 20 to 35 percent rock fragment by volume and a texture of loam to sandy clay loam in the substratum. Included in this unit are 15 percent of the soil described in Unit u to 5 percent of the soil described in Unit q.

TABLE 222m.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 17
MAPPING UNIT: t

VEGETATIVE: SPRUCE/FIR
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-2	10YR 3/2	10YR 2/2	35	44	21	Loam	3f gr	0	7.82
B21	2-11	10YR 4/2	10YR 3/3	35	41	24	Loam	2f sbk	5 gr	3.09
B22+	11-20	10YR 5/2	7.5YR 3/3	32	44	24	Loam	1f sbk	3 gr	1.35
C	20-33	10YR 6/3.5	10YR 4/4	35	40	25	Loam	massive	20 gr 5 cob	0.27
R	33	-	-	-	-	-	-	-	-	-

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A1	7.20	eo	0.68	104.0	17.7	4.96	0.06	75
B21	7.36	eo	0.32	50.7	8.5	5.60	0.10	41
B22+	7.48	eo	0.21	31.4	4.4	6.24	0.14	36
C	7.31	eo	0.19	29.3	4.8	7.68	0.17	30

Taxonomic Classification: Mollic eutroboralfs coarse-loamy, mixed, frigid with 15% u and 5% q

MAP UNIT u

This unit consists of well drained soils that have formed in residuum. Slopes range from 2 to 8 percent. Elevations range from 8000 to 8900 feet. Present vegetation is predominately aspen.

Erosion is slight at present and the erosion hazard will be slight when disturbed. Suitability rating for topsoil is fair due to depth to bedrock. Range of characteristics include a surface layer 8 to 12 inches thick with 0 to 5 percent rock fragment by volume. The substratum is moderately deep to bedrock at a depth of 35 to 40 inches. Texture is clay loam or sandy clay loam. Rock fragments by volume range from 10 to 20 percent. Included in this unit are 10 percent of a similar deep soil and 5 percent of the soil described in Unit t.

TABLE 222n.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 18
MAPPING UNIT: u

VEGETATIVE TYPE: ASPEN
LOCATION:PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A11	0-3	10YR 3/2	10YR 2.5/2	33	41	26	Loam	3m gr	3 gr	7.15
A12	3-9	10YR 4/2	10YR 2.5/1	37	37	26	Loam	3m sbk	0	2.76
B21	9-15	10YR 5/3	7.5YR 3/35	41	24	Loam	2c sbk	0	0	0.61
B22	15-23	10YR 6/3	10YR 3/3	35	40	25	Loam	2m pr	5gr 10cob	t
C1	23-32	10YR 6/4	10YR 3/3	35	37	28	Clay/Loam	1f sbk	15gr	t
C2	32-37	10YR 6/4	10YR 4/4	31	36	28	Clay/Loam	massive	15gr	t
R	37	-	-	-	-	-	-	-	-	-

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A11	7.23	eo	0.80	134.0	19.30	4.96	0.05	57
A12	7.33	eo	0.41	61.9	9.14	6.72	0.11	39
B21	7.41	eo	0.28	36.5	5.49	7.52	0.15	32
B22	7.45	eo	0.21	27.7	4.46	6.88	0.16	27
C1	7.26	eo	0.23	32.5	6.03	10.2	0.54	27
C2	7.16	eo	0.30	21.3	3.98	16.80	0.44	33

Taxonomic Classification: Typic haploborolls

MAP UNIT v

This type consists of shallow, excessively drained soils that have formed in colluvium and residuum. They are on steep to very steep mountain sides. Slopes are 35 to 60 percent. Included is 3 percent of a moderately deep similar soil and 8 percent rock outcrop. Textures range from loam to loamy very fine sand. Depth to fractured bedrock is 14 to 20 inches. Rock fragments range from 35 to 55 percent.

Erosion is moderate at present and the erosion hazard will be severe if disturbed due to sparse vegetation and steep slopes. The potential rating for borrow topsoil is poor due to steep slopes, thin surface layers and the amount of rock fragments. Predominant vegetation is sagebrush with a grass understory.

TABLE 222o.
SOIL ANALYSIS DATA, PROFILE DESCRIPTION, SAMPLE SITE 7
MAPPING UNIT: v

VEGETATIVE TYPE: SAGEBRUSH
LOCATION: PERMIT AREA

HORIZ.	DEPTH	COLOR		TEXTURE			CLASS	STRUCTURE	PERCENT	
		DRY	MOIST	SAND	SILT	CLAY			ROCK FGTS.	ORG. MAT.
A1	0-5	10YR 4/2	7.5YR 3/2	51	31	18	l	2f gr	15gr 15k 10s	5.25
B2	5-16	10YR 5/3	10YR 4/3	50	33	17	vfsl	2f sbk	5gr 30k 15s	1.32
R*	-	-	-	-	-	-	-	-	-	-

Horizon	pH	Effervescence	EC x 1000	Solubility ppm			SAR	Percent Moist. Satur.
				Ca	Mg	Na		
A1	7.1	eo	0.83	133.4	16.8	12.5	0.14	41
B2	7.1	eo	0.54	84.5	11.7	12.0	0.16	31

Taxonomic Classification: Loamy-skeletal, mixed lithic Cryocrepts
* Sandstone

(Welch,et.al.,Endangered Plant Studies, Inc.,1980)

An Order 1 soil survey was conducted at the White Oak Complex in the area that will be impacted by the surface mining operation. The soil survey was completed in the spring of 2001 by Daniel Larsen, Soil Scientist of Environmental Industrial Services (EIS). The results of the soil survey, the testing results, and maps that depict the soil inventory and topsoil thickness are attached in Appendix 2-1.

Leland Sasser - Soil Scientist with the Soil Conservation Service in Price reviewed the Order 1 Soil Survey data. He classified the soils PC-1 areas are similar to the Croydon (22) with some Toze (28) characteristics, the PC-2 areas are similar to the Toze (28) family. The CBF areas are similar to the Uinta (124) family. The TC area is similar to the Croydon (22) with some Curecanti (23) family characteristics. The AV area is similar to the Silas loam (108). The present production of these areas based on unfavorable production due

to the lower moisture over the last few years. Data provided is from Table 4 of the Soil Survey of Carbon Area , Utah - June, 1988.

Soil Name	Map Symbol	Total Production	
		Kind of Year	Dry Weight Lb/Acre
Croydon	(22)	Favorable	2,000
		Normal	1,500
		Unfavorable	1,000
Curecanti	(23)	Favorable	1,400
		Normal	1,000
		Unfavorable	600
Toze	(28)	Favorable	400
		Normal	250
		Unfavorable	100
Silas	(108)	Favorable	3,500
		Normal	3,000
		Unfavorable	2,500
Uinta	(124)	Favorable	100
		Normal	75
		Unfavorable	50

224. SUBSTITUTE TOPSOIL.

Refer to 231.200 through 231.300.

230. OPERATION PLAN.

231. GENERAL REQUIREMENTS.

231.100.

The General Office Area and the Belina Haul Road were constructed pre-law, with the General Office Area to be retained as a field office for Kanawha Hocking Coal & Coke Company after reclamation. The Belina Haul Road being pre-law as well, no topsoil was preserved, but exhibits the same natural revegetation capabilities as does the Belina Mine Site and Valcam areas.

The Valcam Loadout Facility was also established prior to the topsoil requirement; however, some "substitute topsoil" 8(Vegetation Supporting Material) was harvested, analyzed, and approved. This material is stored at the Belina Mine Site for use at that site. The material has been stabilized with vegetation and erosion control measures. The VSM stockpile contains approximately 975 cu. yds. of soil which came from the enlargement of the 002A sediment pond, near the truck scale at the Valcam Loadout Facility. The volume

of soil was approximated using the AEA method. The excavated material met the criteria of and was approved by the Division.

Topsoil, at the current Belina Mine Site, was moved prior to the topsoil requirements. The area is shown on Map 231.100. After the completion of underground mining, the barrier coal along the out crop of the coal seams will be removed. The topsoil material also shown on Map 231.100 will be removed and stored then redistributed.

Topsoil and/or alternate materials will be redistributed over the backfilled slopes in non-uniform thickness. The surface of the redistributed material will be left roughened in order to reduce wind and water erosion, providing favorable microsites for seed germination, and inhibit "crusting" of the soil surface.

The permit area increased by approximately 160 acres with the addition of the 1999 Lease Modification area. No disturbance is planned for the surface of that area, the additional area will be used for subsurface coal removal. Plate 2-1 shows the soils associated with the lease modification area, see Section 10.

MAP 231.100. Topsoil Salvage Areas

231.200.

There are no plans to obtain topsoil or substitute topsoil from an off-site source during mine operation. The existing disturbed slopes vacant of topsoil or substitute topsoil, which have been temporarily revegetated, reflect the growing properties of the exposed subsoil strata, and conversely has no indication of incompatible soil characteristics being present. Supplemental to that fact, natural revegetation is occurring on all disturbed area slope planes. It is Valley Camp's position, since this phenomena has taken place and continues to transpire, the VSM area fill materials clearly meet standards set forth for a VSM.

At the Divisions request, when weather permits, in early 1993, Valley Camp has solicited the Carbon County SCS office to evaluate site specific conditions and make a determination if a soil survey would be needed at this point in time to determine suitability of the disturbed area soils for revegetation. If the SCS deems a survey necessary, Valley Camp would then furnish the SCS office with a mylar positive of Potential Map 233, Sheets 1 through 4, Titled: SCS 1993 Disturbed Area Soil Survey, (Scale 1"=100') to depict and describe their survey and results thereof. Upon SCS completing the project, maps and results will be submitted for inclusion in the Reclamation Plan and Appendices, with an additional copy in the "Annual Summary".

231.300.

Valley Camp is confident the disturbed areas soils demonstrate suitability for use as a vegetation-supporting-material as evidenced by the existing slope conditions and vegetation. The re-seeded cut slopes and the fill slopes with and without topsoil and having no special attendance withstood two years of 200+ above normal precipitation with no apparent erosion problems followed by several years of aridity since, are supporting vegetation and characterizing natural revegetation on all the perimeter slopes. The only cut slopes not demonstrating suitability are those with a near vertical attitude. See Map 231.300 titled "Suitability of Topsoil Substitutes" illustrating the various slopes.

MAP 231.300. Suitability of Topsoil Substitutes VSM - (Sheet 1)
MAP 231.300. Suitability of Topsoil Substitutes VSM - (Sheet 2)
MAP 231.300. Suitability of Topsoil Substitutes VSM - (Sheet 3)
MAP 231.300. Suitability of Topsoil Substitutes VSM - (Sheet 4)

231.400.

The Site #1 topsoil storage area at the Belina Mine Site is closely surrounded by dense forest exhibiting a medium amount of dead-fall and heavy ground cover. This provides excellent protection against wind erosion as well as rapid snow melt in the spring.

Drainage control ditches encompass the storage area to direct any migration of material toward the bermed basin at the east end of the stockpile. The bermed basin also denies vehicle access on to the stockpile.

Straw bales or silt fence will be utilized to assist in containment, should a stockpile slope failure occur. The Site#1 stockpile has been successfully vegetated with the approved temporary seed mix and no longer requires straw bales for containment.

Additional topsoil storage sites required during the surface mining process of the barrier coal at the White Oak Mine Site will be placed on a stable area within the permit area and protected from contamination, compaction, and erosion. These storage sites are identified on Plate R645-301-521.165 Potential Topsoil Storage Piles and Cross Sections. The piles will be constructed on 2:1 slopes. Pile #1 which is along the drill road above the surface mining activity has a potential volume of 6,500 cubic yards with the base being the road and extending to just inside the disturbed area boundary. The average dimensions are 39 feet wide, 815 feet in length and 5.53 feet thick. Pile #2 is located on the coal storage pad and has a potential volume of 26,800 cubic yards. The average dimensions are 130 feet wide, 225 feet in length and 24.74 feet thick. Pile #3 on the truck loop adjacent to the temporary spoil storage site will be placed against the spoil storage pile with a height near 50 feet at the top. This site has a potential 26,800 cubic yards at the current footprint. The average dimensions are 100 feet wide, 250 feet in length and 28.94 feet thick. Pile #4 along the road adjacent to Sediment Pond 004A will extend up the adjacent hillside being tapered at the top so drainage will move around the pile. This site has a potential of 25,250 cubic yards. The average dimensions are 220 feet wide, 200 feet in length and 15.49 feet thick. Pile #5 is located west of the coal storage pad and has a potential of 14,200 cubic yards. The average dimensions are 100 feet wide, 200 feet in length and 19.17 feet thick. Pile #6 is located on the current spoil storage pile and has a potential of 2,800 cubic yards. The average dimensions are 50 feet wide, 180 feet in length and 8.4 feet thick. The identified site locations have adequate storage capacity for the topsoil to be removed.

232. TOPSOIL AND SUBSOIL REMOVAL.

232.100. THROUGH 232.720.

At the White Oak Mine Site all efforts will be made to save as much of the natural topsoil as possible. All available topsoil will be salvaged dependent upon site conditions and equipment limitations.

After clearing and grubbing the initial surface mining area, the topsoil will be removed and stored (or whenever possible redistributed). If the topsoil is greater than six (6) inches in depth, the entire depth of the topsoil horizon will be removed. If the topsoil is less than six (6) inches in depth, a six (6) inch layer that includes the topsoil and the unconsolidated material immediately below will be removed. Refer to Map J-2 Top Soil Thickness in the Order 1 Soil Survey in Appendix 2-1. No Topsoil will be recovered in the slump areas (SZ) and the current highwall area designated as (DZ). Topsoil will be segregated into three groups 1) areas of aspen zones PC-1, PC-2, TC and VSM, 2) areas of conifer zones CBF and AV, 3) the upper Whisky Creek stream channel. See Map J-1 in Appendix 2-1 for soil group locations. The piles will be stored separately for reapplication. Topsoil pile locations for White Oak Complex on Map R645-301-521.150 Sheet 4a of 4.

VSM soil will be recovered from the revegetated slope above the #2 Mine portals that will be affected by the surface mining operation. The soil depth to be removed from this area is 3 inches below root depth. Three pits were dug to determine the depth of the root matter on this slope. The three holes all showed that the root depth was at 6 inches.

Projected available topsoil from the surface mining area at the White Oak Complex is broken down in Table 232a.

TABLE 232a.
TOPSOIL RECOVERY VOLUMES
SURFACE MINING

Soil Type Location	Soil Type ID from Map J-2 Appendix 2-1 and Map 231.100	Acreage	Approximate Volume (CY)
Conifer Areas	CBF	4.074	7,668
	Current Topsoil Pile		975
	AV	0.068	45
	Subtotal	4.142	8,688
Whisky Creek Channel	Subtotal	0.161	260
Aspen Areas	PC-1	5.117	16,510
	TC	.225	423
Soil Type Location	**Soil Type ID from Map J-2 Appendix 2-1 and Map 231.100**	**Acreage**	**Approximate Volume (CY)**
Aspen Areas-cont.	PC-2	7.969	35,178
From Revegetated Area below Bathhouse	VSM-1	3.554	4,300
	Subtotal	16.865	56,411
	Total(approximate)	21.168	65,359

A qualified soil scientist will be on site during the stripping of topsoil. Topsoil will be removed to the proper depth by use of an island (pedestal) method.

233. TOPSOIL SUBSTITUTES AND SUPPLEMENTS.

The vast majority of the disturbance transpired pre-law and the fact the (soils) materials for reclamation will be derived from the fill areas required to reestablish the Whisky Creek channel negate the need for another attempt to satisfy the regulations dealing with a permit application.

All alternate topsoil material to be removed during the surface mining of the barrier coal at the White Oak Mine Site will be generated during the spoil removal process and concurrent with other surface mining operations. Stockpiling operations will be conducted in a controlled manner sufficient to keep the alternate topsoil material segregated from any other non-topsoil materials.

Additional information provided related to topsoil substitutes and supplements to be used on reclaimed lands is found with the Reclamation Plan portion of this permit submittal.

234. TOPSOIL STORAGE.

234.100. THROUGH 234.320.

The topsoil material, which is stored, will be placed on a stable area within the permit area and protected from contamination, compaction, and erosion. The location of the storage areas are shown on Map 231.100. Additional storage areas may be operationally necessary and will meet the regulation requirements for a topsoil storage area. An approved temporary seed mixture will be sown on the stored material, and the storage areas will remain vegetated for the duration of the mining operation. The storage area will be identified by the appropriate signs and markers.

Reclamation of each disturbed area will take place during the first appropriate season following the time when that area becomes available for such activities. Certain affected areas, such as cut and fill slopes on roads, operation pads, and outside slopes of sediment ponds, which required disturbance early in the operational life of the mines, appear to be stable and are revegetated but will be reevaluated by Valley Camp and the Division to determine practicality and magnitude of redisturbance of these areas prior to the commencement of reclamation. Other affected areas occupied by support facilities will not be reclaimed until the conclusion of mining activities. Refer to 231.100.

240. RECLAMATION PLAN.

Information related to reclamation applicable to this section has been moved to the MRP volume of the August 1993 permit submittal.

242. TOPSOIL REDISTRIBUTION.

Topsoil and/or alternate materials will be redistributed over the backfilled slopes in non-uniform thickness, a thickness of 9 inches(+/- 25%) in the areas where pine trees are prevalent, a thickness of 16 inches (+/- 25%) in the aspen areas and a minimum thickness of 6 inches in the shrub/grassland zones. Table 242a shows the redistribution of the topsoil after the completion of the surface mining and then after the removal of the coal storage pile, truck loop and sediment pond 004A.

The material that topsoil will be placed on will be finer by-products of the blasted shales and sandstones. The natural gradation of the larger rocks migrating to the bottom and the finer particles on the top occurs during the dumping and pushing of blasted spoil material. Also, the action of the trucks and dozers moving material will degrade any larger fragments during the rough and final grading before the topsoil placement. This layer of material should consist of no more than 35% rock fragments and be approximately two foot in thickness.

This material in the spoil has been tested vegetation supportive material (VSM) that has been an approved part of this permit for topsoil material prior to the incorporation of the surface mining operation at the White Oak Complex.

A qualified soil scientist will be on site during the redistribution of topsoil. Soils will be redistributed to the proper depth by the use of stakes with depth marks on them.

TABLE 242a
TOPSOIL REDISTRIBUTION

Location	Stockpiled topsoil (CY)	Acreage	Redistributed topsoil on Surface Mining Area (CY)	Acreage	Redistributed Topsoil on Coal Storage, Truck Loop, & Pond 004A (CY)
Conifer Areas	**8,688**	**4.142**	**5,569**	**2.577**	**3,119**
Upper Whisky Creek	**260**	**.161**	**260**		**0**
Grassland/shrub	**21,221**	**14.334**	**12,932**	**9.188**	**8,289**
Aspen/VSM	**35,190**	**10.793**	**25,305**	**5.605**	**14,173**
Total	**65,359**	**29.43**	**42,062**	**17.37**	**23,297**

Initial reclamation will involve 29.43 acres and the final reclamation 17.37 acres. The total acres for topsoil redistribution excluding the haul road is 46.8 acres. Some soil from the Aspen/VSM topsoil storage will be used in the Grassland/shrub zones. Areas for the redistribution of topsoil at the White Oak Complex is shown on Map R645-301-242 Topsoil Redistribution.

MAP 242 Topsoil Redistribution

250. PERFORMANCE STANDARDS.

Refer to the Reclamation Plan section of the MRP.

251. THROUGH 252.

All topsoil and Vegetation-Supporting Materials, will be stockpiled, maintained, and redistributed according to 230 and 240. Topsoil will be segregated into three groups 1) areas of aspen zones PC-1, PC-2, TC and VSM, 2) areas of conifer zones CBF and AV, 3) the upper Whisky Creek stream channel. See Map J-1 in Appendix 2-1 for soil group locations. The piles will be stored so material for the stream restoration is separated from the other materials. The VSM and aspen zones will be intermixed for re-application. The conifer zones and the topsoil stockpile in the trees at White Oak Complex will be intermixed for re-application.

The topsoil stockpiles will be sloped at a 2:1 or a less steeper slope. The perimeter of the pile will be protected from erosion by either a berm or silt fence. The surface of the pile will be roughen and slash material from the grubbing process may be applied to reduce erosion. If the topsoil pile is created during a season other than fall, an annual grain will be broadcast at the rate100 PLS/acre on the topsoil pile. In the fall, the interim mix will be applied to any topsoil remaining in storage. The interim seed mix is found on page 16 of the Operation Plan. Any severe rills or gullies will be filled by raking in the side material and reseeding with the interim seed mix.

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VALLEY CAMP ACT/007/001 REVISION			INCORPORATED INTO MRP BY DOGM		
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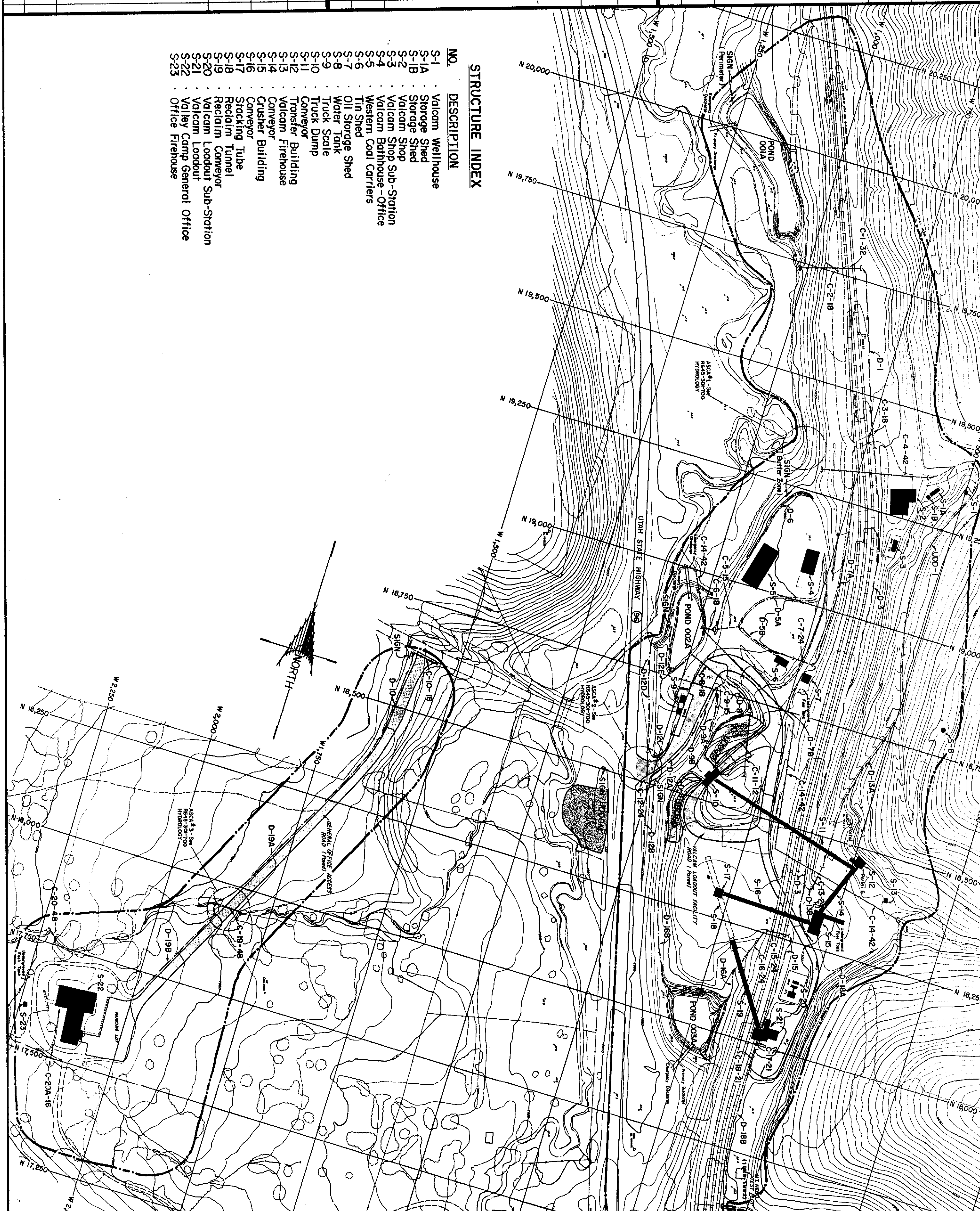
STRUCTURE INDEX

NO.	DESCRIPTION
S-1	Valcam Wellhouse
S-1A	Storage Shed
S-1B	Storage Shed
S-2	Valcam Shop
S-3	Valcam Shop Sub-Station
S-4	Valcam Bathhouse-Office
S-5	Western Coal Carriers
S-6	Tin Shed
S-7	Oil Storage Shed
S-8	Water Tank
S-9	Truck Scale
S-10	Truck Dump
S-11	Conveyor
S-12	Transfer Building
S-13	Valcam Firehouse
S-14	Conveyor
S-15	Crusher Building
S-16	Conveyor
S-17	Stocking Tube
S-18	Reclaim Tunnel
S-19	Reclaim Conveyor
S-20	Valcam Loadout Sub-Station
S-21	Valcam Loadout
S-22	Valley Camp General Office
S-23	Office Firehouse



LEGEND:

- Structure
- Valley Camp Roads (Paved)
- Culvert
- Ditch
- Disturbed Area Boundary
- Cedar Creek 1986
- UDOGM-VC 1992
- Proven Soil To be harvested

DIVISION OF OIL GAS & MINING

NOTES:

1. For all Hydrology information and structures see HYDROLOGY SECTION (700)

REGISTERED PROFESSIONAL ENGINEER No. 5323 EDWIN BROOKSHIRE FOUST STATE OF UTAH

VALLEY CAMP OF UTAH, INC.

SCOFIELD ROUTE, HELPER, UTAH 84526

TITLE: R645-301-231.300 SUITABILITY OF TOPSOIL SUBSTITUTES - VSM

Drawn by: Ed Sanderson | Date: 3/93

Approval: | Date:

Drawing No. R645-301-231.300 | Rev. 1 3/93

SAND DESIGN & GRAPHICS

SCALE: 1" = 100'

SHEET 1 of 4

ETS-5-89

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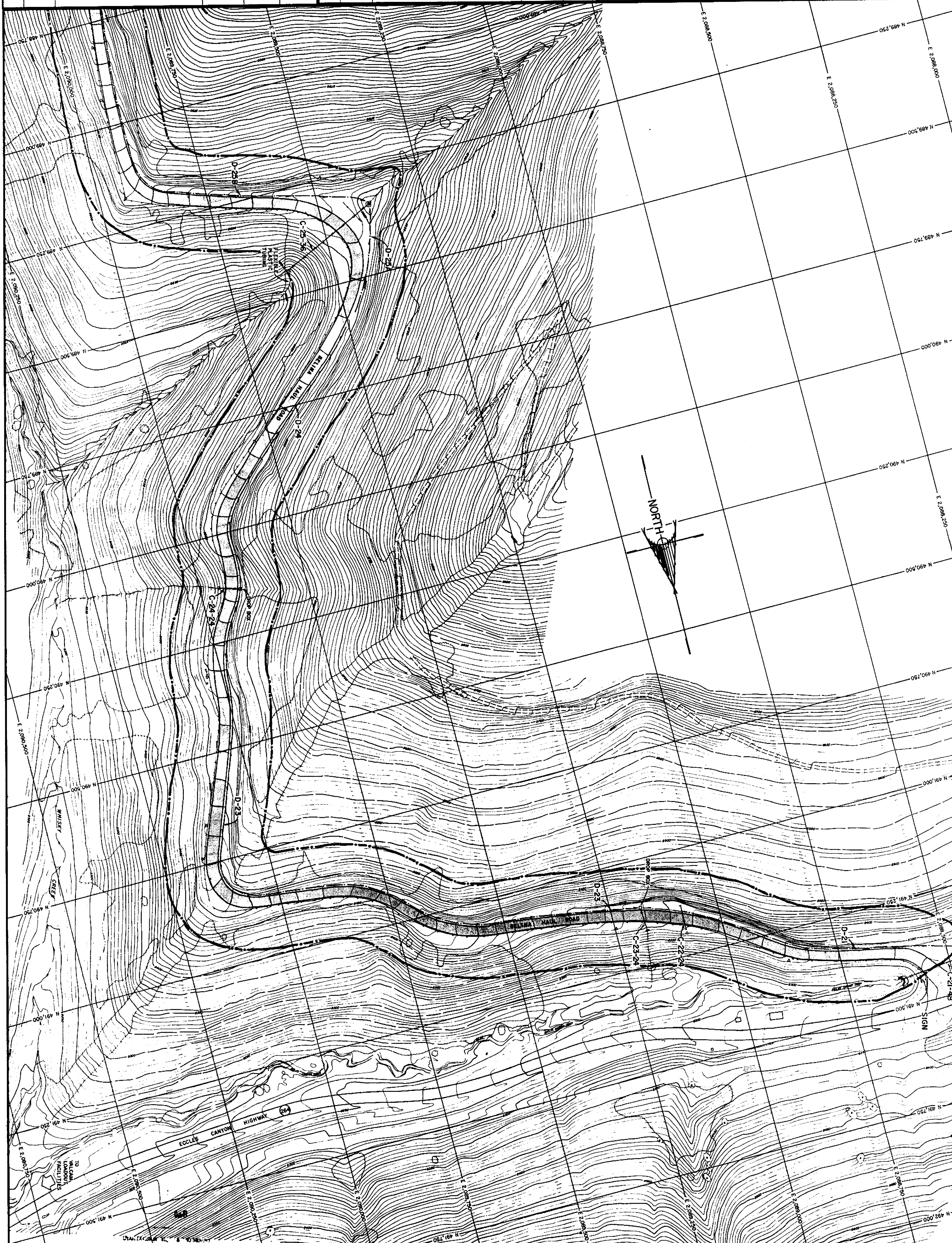

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Note: See Sheet 1

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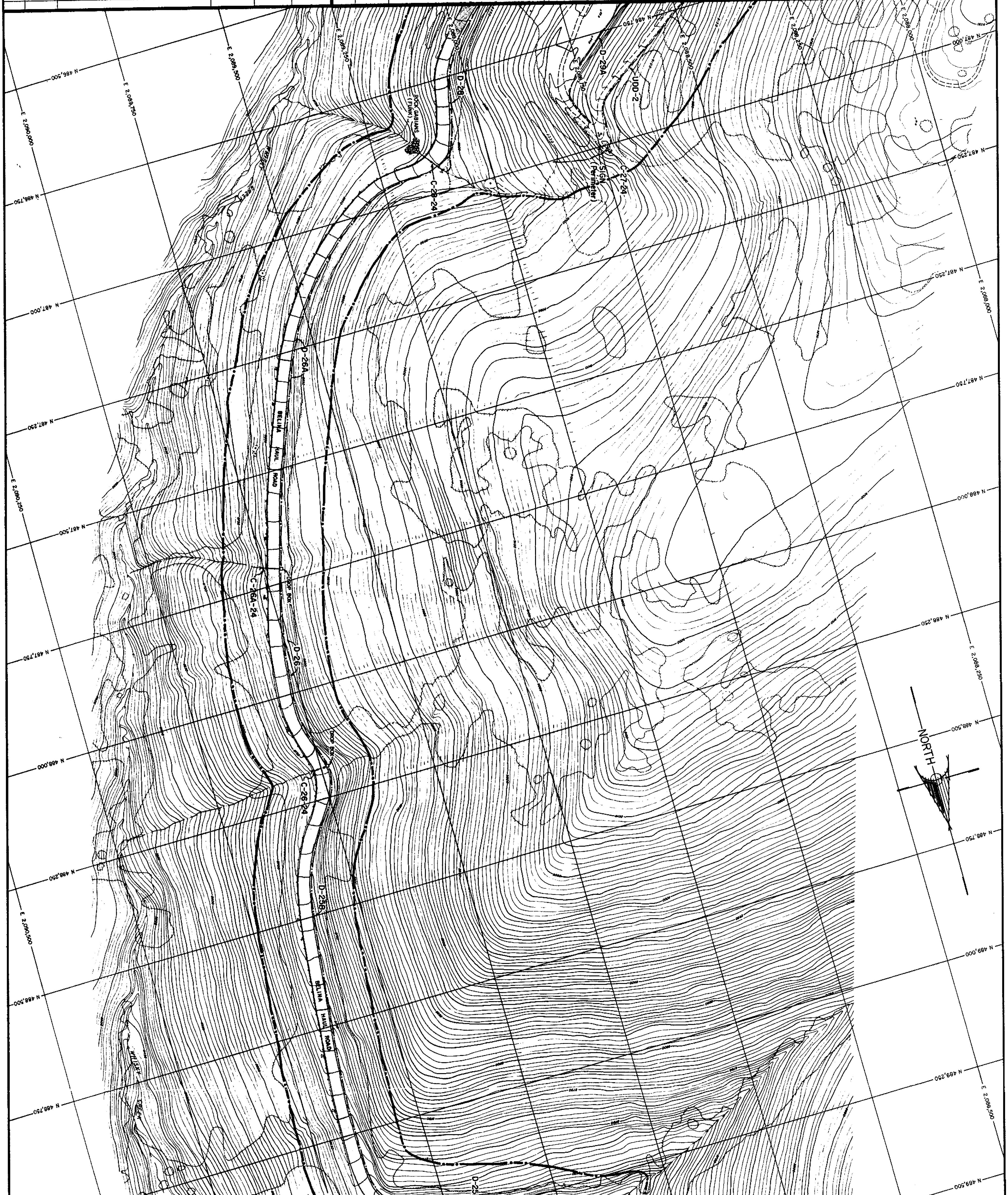

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Mar 93
STATE OF UTAH

VALLEY CAMP OF UTAH, INC.

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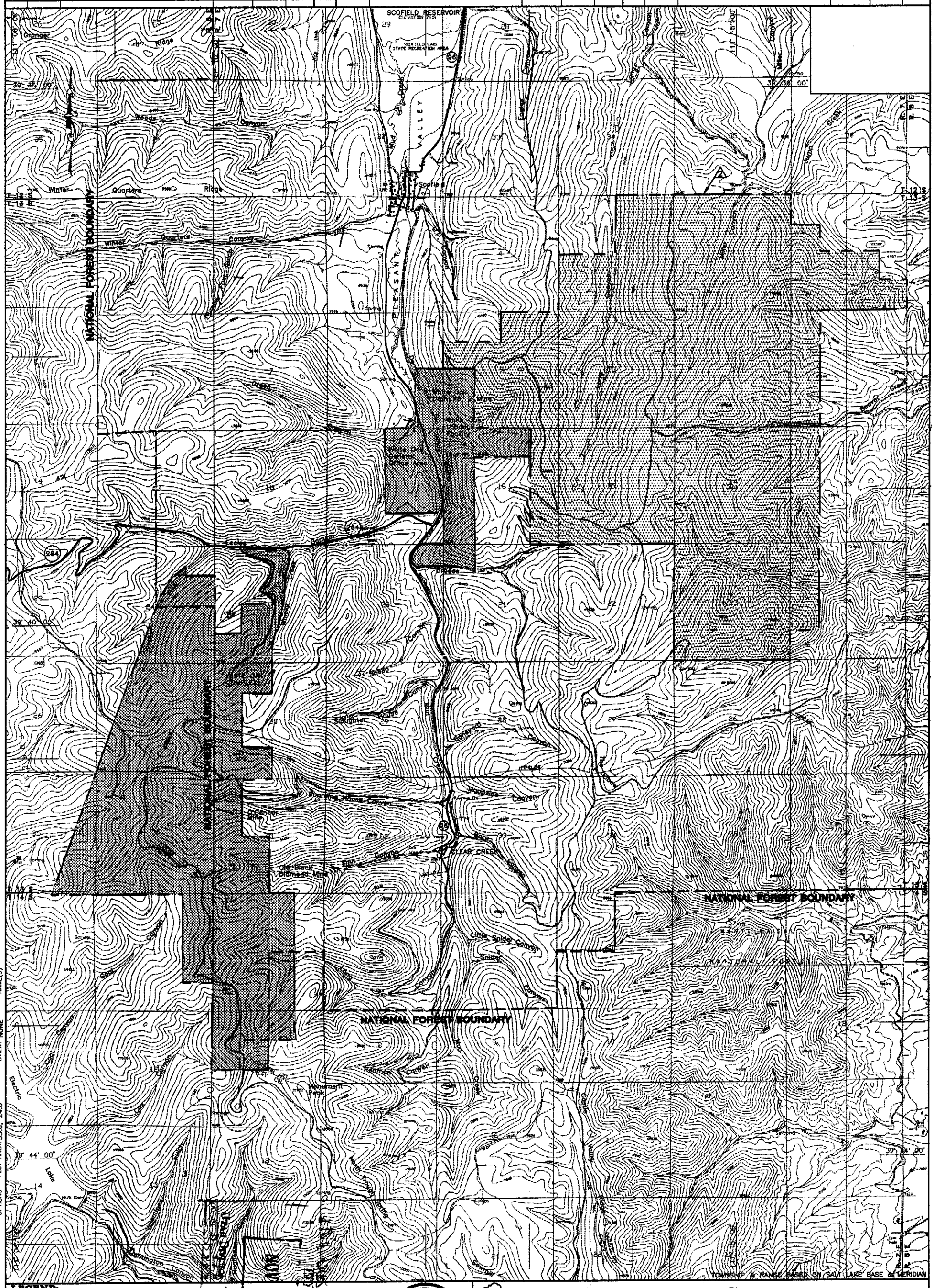
2	8/94	ADDED MINE PERMIT BOUNDARY NO. 2															



LEGEND:

- MINE PERMIT BOUNDARY NO. 1
- MINE PERMIT BOUNDARY NO. 2
- NATIONAL FOREST BOUNDARY

CERTIFICATION STATEMENT

I Certify that the information provided hereon is to the best of my knowledge true and correct as reflected by previous mapping and available data provided from either the coal operator or public files at the time of its preparation.

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SCOFIELD ROUTE, HELPER, UTAH 84526

PREPARED BY: HANSEN ALLEN & LUCE, INC.

VERIFY SCALE: 0" — 1" BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY.

TITLE: R645-301-100 PERMIT AREA BASE MAP

DRAWN BY: Ed Sanderson DATE: Oct./1990

APPROVAL: DATE:

DRAWING NO.

SCALE: 1" = 2000'

SHEET: 1 of 1

FILE NAME: TOPO\100-BASE.DWG | FILE DATE: SEPT. 07, 1994 | PLOT OPTIONS | PLOT IN = DWG UNITS: 1 = 1 PLOT AREA: 35.0, 24.0 | ORIGIN: 0.0,0.0 DVIEW: NONE | XREF FILE NAME(S): Z:\CAD\125\07-100\TOPO\WO-TITLE.DWG

7/94

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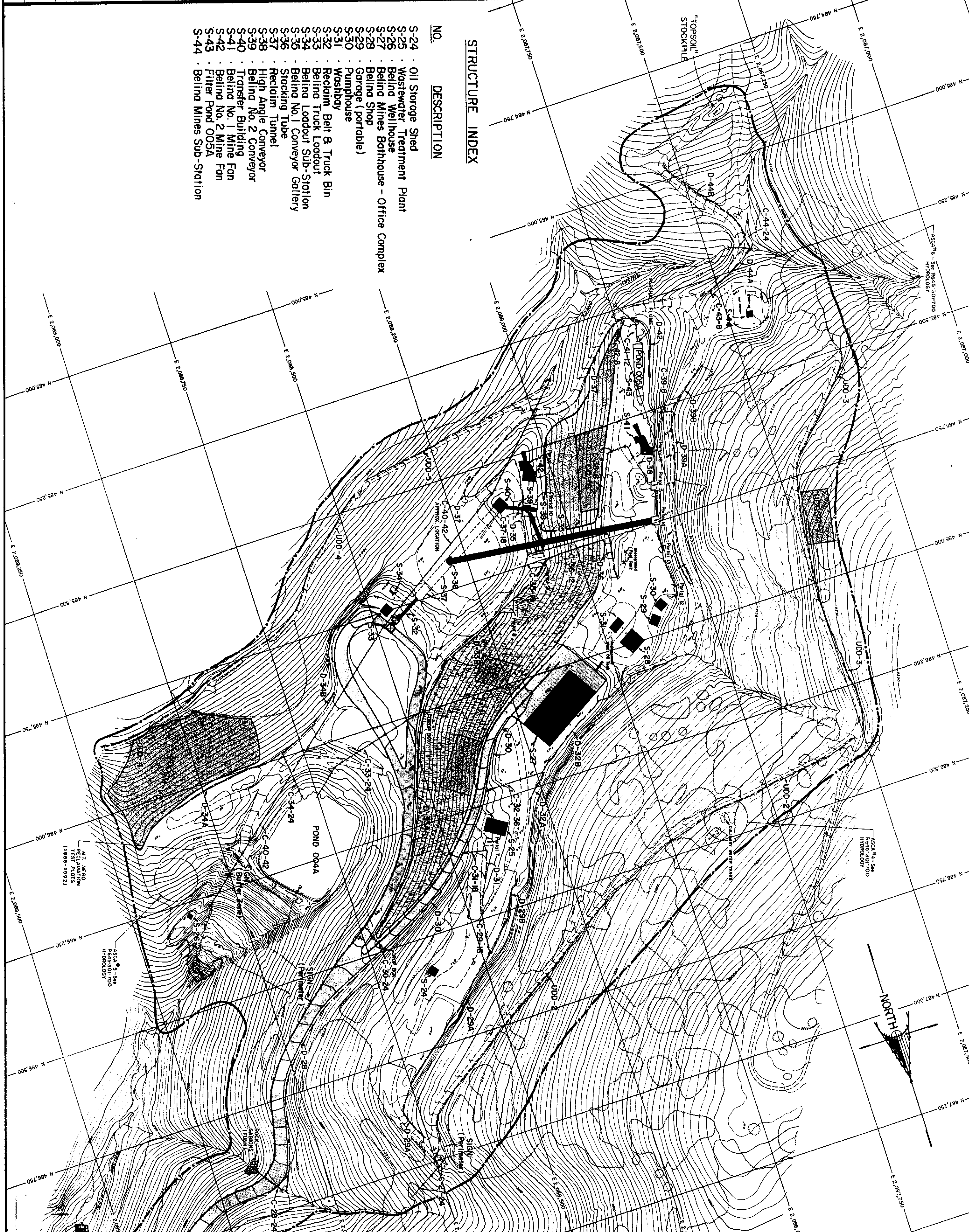

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NOTE: See Sheet 1

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